Post-operative MRI visualisation; Intra-operative curve correction; Reduction in metallic corrosion versus SS constructs, and

References

Potential Clinical Benefits

CoCr alloy rods maintain spinal alignment better than Ti rods, facilitating intraoperative correction of scoliotic deformity.

Fusion for correction of spinal deformity is extremely complex and technically demanding. Innovation in technique, instrumentation, and implants has focused on the attainment of optimal spine alignment through three-dimensional correction. To that end, early efforts focused on restoration of coronal alignment (as seen on an anterior-posterior x-ray), though these often resulted in loss of alignment in the sagittal (lateral) plane. Sagittal alignment is a particular concern for patients with adolescent idiopathic scoliosis (AIS), for whom inadequate preservation of a thoracic forward curve (kyphosis) may result in disabling pain.

Several intraoperative techniques have been suggested to restore thoracic kyphosis, including contouring kyphosis into the rod. Both Ti and standard strength SS rod tend to “flatten” out, resulting in hypokyphosis in all pedicle screw constructs. The prevalence of this challenge was highlighted by Betz, et al., who demonstrated that posterior spinal fusions failed to improve hypokyphosis in 60% of cases.

The stiffness of rods used for deformity correction affects their ability to hold correction and minimise changes in rod curvature; the stiffer the rod, the fewer changes in rod curvature. When compared to both Ti and high/ultra strength SS rods of the same diameter, CoCr alloy rods offer maximum stiffness best during correction maneuvers. As described by Lonner, this attribute is advantageous by allowing correction of rigid curves and restoration of kyphosis.

CoCr alloy rods allow for superior visualisation on magnetic resonance imaging (MRI) when compared to stainless steel rods.

When postoperative complications arise after surgery, MRI is frequently required to guide clinical decisionmaking. For this reason, the ability to accurately assess implant position and detect clinically relevant abnormalities is of paramount importance.

The selection of rod and screw materials used for spine fusion affects the ability to evaluate post-operative MRI. Dennis et al. highlight this issue in a recent comparison between artifacts produced by the following screw-rod combinations: SS-SS, Ti-Ti, and Ti-CoCr. Artifacts were least for Ti-Ti, intermediate for Ti-CoCr, and the greatest for SS-SS. However, both Ti-Ti and Ti-CoCr permitted visualisation of the spinal canal to rule out postoperative pathology, while SS-SS did not (Figure 2).

CoCr alloy rods should have better corrosion resistance than SS component systems.

All metallic implants may corrode at least a small amount when placed inside a body. Metallic corrosion has been implicated as a potential cause of infection, pain and swelling, and implant failure. However, the potential for corrosion should be minimised. Griffin and colleagues found Ti alloy coupled with CoCr alloy to be acceptable under accelerated corrosion conditions. However, they did not recommend coupling either of the alloys with stainless steel due to the higher susceptibility of the stainless steel to pitting corrosion.

CoCr alloy rods afford hospitals an opportunity to streamline inventory and potentially reduce inventory handling costs.

CoCr alloy rods allow surgeons and hospitals to replace SS implant sets, which have limitations for post-operative imaging and Ti rods of the same diameter, which offer less stiffness for curve correction for patients with spinal deformity.

Substitution of SS implant sets (SS rods and SS screws) with CoCr sets (CoCr rods and Ti screws) should also reduce set weight, thereby reducing materials-handling burden.

About the EXPEDİUM Spine System Cobalt-Chromium Alloy Rods

- The EXPEDİUM CoCr Alloy Rods are designed to maintain the sagittal and coronal alignment surgeons demand for deformity correction, without compromising imaging capabilities;
- The EXPEDİUM CoCr Alloy Rods are compatible with the EXPEDİUM Titanium System that surgeons have utilised for many years;
- In combination with the EXPEDİUM brand innovative designs, the the EXPEDİUM CoCr Alloy Rods increase the breadth of options available to manage challenging deformity cases.